WHAT IS CLAIMED IS:

1. An autonomous down hole instrument package assembly for determining deviation angles off vertical comprising:

a) a non-conductive cylindrical body member having metallic end caps for connection to typical down hole running gear, said body having an electronic communication port externally accessible;

b) a means for disassembling said body member into a plurality of sub-sections;

c) a self-contained power supply located within one of said sub-sections;

d) a microprocessor connected electrically to said power supply and said communication port located within one of said sub-sections;

e) a solid-state angle direction-sensing unit having at least a tilt engine and a compass engine capable of determining deviation angles off vertical connected to said microprocessor located within at least one of said subsection.

2. The autonomous down hole instrument package assembly according to claim **1** wherein said running gear comprises a lower shock absorbing member and an upper member containing a self deploying centralizing means.

3. The autonomous down hole instrument package assembly according to claim **2** wherein said self deploying centralizing means comprises a first elongated tubular body member having internal detent ridges, a second elongated tubular member having a solid portion at one end and a detent means located at the opposite end, said

second tubular member being telescopically slidable within said first elongated tubular body member, a swivel spear head member adapted for coupling with retrieval tools, attached to said solid portion and a flexible stabilizer band located externally of and intermediate to said solid portion of said second tubular member and said first tubular body member.

4. The autonomous down hole instrument package assembly according to claim **1** further comprising a surface computer loaded with a proprietary program and at least one communication cable connectable between said surface computer and said communication port.

5. The autonomous down hole instrument package assembly according to claim **1** wherein said power supply comprises a high temperature and pressure resistant dry cell battery pack having a voltage between **7** and **25** volts with voltage and current regulation to **5** volts and a maximum of **52** milliamps.

6. The autonomous down hole instrument package assembly according to claim **1** wherein said sensing unit further comprises a temperature monitor.

7. The autonomous down hole instrument package assembly according to claim **1** wherein said microprocessor further comprises an instrument clock.

8. An autonomous down hole instrument package assembly for determining deviation angles off vertical comprising:

a) a non-metallic sealed casing sleeve comprising:

i) a power supply sub-section containing a battery pack;

ii) a communication sub-section including an input/output communication port attached to said power supply sub-section;

iii) an instrument sub-section containing an electronic instrument package assembly connected electrically to said battery pack and said connector port;

b) a means for removably connecting said casing sleeve to a down hole running gear assembly;

c) a computer means for preloading well survey parameters into said instrument package assembly and extracting accumulated data; and

d) an electrical communication means for temporarily connecting said computer means to said input/output communication port.

9. The multi-shot autonomous down hole instrument package assembly according to claim **8** wherein said running gear comprises a deployable centralizer.

10. The multi-shot autonomous down hole instrument package assembly according to claim **8** wherein said battery pack is a high temperature and pressure resistant dry cell having a voltage between **7** and **25** volts with voltage and current regulation to **5** volts and a maximum of **52** milliamps.

11. The multi-shot autonomous down hole instrument package assembly according to claim **8** wherein said instrument package assembly comprises a microprocessor, a micro

data storage card, a clock, an angle/direction sensor having a solid state tilt compensated compass engine with dual axis tilt sensor, a solid state tilt or pitch engine, and a temperature monitor all arranged on a linear circuit board.

12. The multi-shot autonomous down hole instrument package assembly according to claim **8** wherein said computer utilizes a proprietary computer program for analyzing accumulated down hole data.

13. The multi-shot autonomous down hole instrument package assembly according to claim **9** wherein said centralizer comprises:

a) a tubular body member having internal detent ridges ;

b) a elongated tubular member having a solid portion at one end and detent means at the opposite end, said body being telescopically slidable within said tubular body member;

c) a swivel spear head adapted for coupling with retrieval tools attached to said solid portion; and

d) a flexible stabilizer band located externally of and intermediate to said solid portion of said tubular member and said tubular body.

14. The multi-shot autonomous down hole instrument package assembly according to claim **13** wherein said stabilizer band expands outwardly upon longitudinal impact of the running gear with the bottom of the well.

15. A method for determining deviation angles off the vertical axis of a well bore comprising the steps of

a) preprogramming an autonomous solid state down hole instrument package assembly having an onboard microprocessor and memory storage capability with instructions for taking a plurality of instrument sensor readings starting at a predetermined time and at precise time intervals thereafter;

b) recording said sensor readings in said memory storage;

c) fitting said instrument package assembly with down hole running gear having shock absorbing and self-deployable centralizer capability;

d) inserting said instrument package assembly and running gear within the central bore of a drill stem extending to the bottom of a well bore to be surveyed;

e) allowing said instrument package assembly and running gear to free fall through said central bore to impact at the bottom of said drill stem;

f) withdrawing said drill stem containing said instrument package assembly and running gear;

g) recording depth of said instrument package assembly on a surface computer at timed intervals corresponding to timed sensor readings being taken by the instrument package assembly;

h) recovering said instrument package assembly upon its return to the surface and downloading data stored in said memory storage to said surface computer; and

i) Processing the recovered data with a proprietary program and thus producing a deviation profile of the well bore relative to the vertical axis.

16. A method for determining deviation angles off the vertical axis of a well bore comprising the steps of:

a) Utilizing a multi-shot autonomous down hole instrument package assembly comprising:

i) a non-conductive cylindrical body member having metallic end caps for connection to typical down hole running gear, said body having an electronic communication port externally accessible;

ii) a means for disassembling said body member into a plurality of sub-sections;

iii) a self-contained power supply located within one of said sub-sections;

iv) a microprocessor connected electrically to said power supply and said communication port located within one of said sub-sections;

v) a solid-state angle direction-sensing unit having at least a tilt engine and a compass engine capable of determining deviation angles off vertical connected to said microprocessor and a clock located within at least one of said subsections.

b) programming said instrument package assembly for autonomous operation down hole by down load from a surface computer means;

c) connecting said instrument package assembly to said running gear;

d) depositing said instrument package assembly and said running gear into the central bore of a drill string and allowing said running gear to free fall to the bottom of said drill string;

e) responding to a dialogue request prompted by said surface computer means;

f) recovering said instrument package assembly upon its return to the surface of said well bore;

g) interrogating said instrument package assembly electronically to recover stored sensor data taken at timed intervals down hole, uploading said data to said computer means; and

h) analyzing said data and preparing charts electronically via a proprietary computer program for download and printout.

17. The method for determining deviation angles off the vertical axis of a well bore according to claim **16** wherein said step of programming said instrument package assembly for autonomous operation down hole by down load from a surface computer means further comprises the steps of connecting said instrument package assembly to said surface computer via a communication cable connecting said communication port, and said surface computer.

18. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said step of programming said instrument package assembly comprises entering delay time and survey interval time into the memory portion of said microprocessor.

19. The method for determining the deviation angles off the vertical axis of a well bore according to claim **18** wherein said delay time is calculated based on the time computed for the instrument to freefall to the bottom of the well, generally about **1000** feet per minute, plus the anticipated time for insertion into the running gear

and the deposition into the drill stem with interval times generally set for **3-5** minute intervals.

20. The method for determining the deviation angles off the vertical axis of a well bore according to claim **18** wherein said interval time is based on the operational time required to withdraw drill stem sections from said well bore.

21. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said running gear comprises a self-deploying centralizing assembly, said assembly being deployed on impact of the instrument package assembly with the bottom of the well bore.

22. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said steps further include the step of initiating a series of interrogations of said sensing unit for data in the form of a temperature sensor, a time stamp from said clock, direction and angle, from said compass engine, pitch and roll returns from said tilt engine, storing said data return from each said interrogation within a data memory bank as a RAW file.

23. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said steps further include the step of interrogating said sensing unit four times for each said survey interval time.

24 The method for determining the deviation angles off the vertical axis of a well bore according to claim 16 wherein said steps further include the step of allowing said microprocessor to sleep between preprogrammed survey intervals.

25. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said steps further include the step of ascending the instrument package assembly from the well bore as a result of removing the drill pipe from the well bore at least one joint at a time while initiating surveys at said preprogrammed timed intervals.

26. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said steps further include the step of ascending the instrument package assembly from the well bore by wire-line.

27. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** wherein said steps further include the step of making a time and depth entry in said surface computer simultaneously with said preprogrammed time interval entered in said microprocessor down hole.

28. The method for determining the deviation angles off the vertical axis of a well bore according to claim **27** wherein said depth entry is made according to the length of drill pipe being removed from the well bore at each interval.

29. The method for determining the deviation angles off the vertical axis of a well bore according to claim **16** further comprising the step of removing said instrument package assembly from said running gear and downloading data stored in said memory into said surface computer.

30. The method for determining the deviation angles off the vertical axis of a well bore according to claim **29** further comprising the step of analyzing said data using a proprietary computer program, creating a plurality of files for output containing a profile of the deviation angle of the well bore relative to a vertical axis.

31. The method for determining the deviation angles off the vertical axis of a well bore according to claim **30** wherein said deviation angles are derived by averaging the data taken at each interval and applying the formula $\sqrt{\sqrt{P} + \sqrt{R}} = D$.